

# Composites for lasting performance

Advanced Composite Solutions for  
Transport and Automotive Industry



# Future materials made today

Wherever weight reduction, durability and safety are the key issues, reinforced composites are replacing conventional materials. Exel Composites, having a long experience in composites, can offer a versatile range of glass and carbon fibre profiles for demanding applications in the transportation and automotive industries.

## Optimized structures with advanced materials

Fibre reinforced composites contain two main elements: fibres and resin. The fibres, mostly glass and carbon, form the structural base of the product. They can be unidirectional as roving or multidirectional in woven fabrics, mats or as crossdirectional fibres. Polyester, vinylester and epoxy are the most common thermoset resin matrices.

Our continuous processes; Pultrusion, Pull-winding and Continuous Lamination enable the most optimised structures to be designed to meet our customer needs in the best possible way.



## Profiles for automotive industry

Pultruded carbon and glass fibre components provide a combination of strength, lightness and economy unmatched by other materials. Multiple components and functions can be integrated into one profile for quick and simple installation. Composites are corrosion free, perform as galvanic insulators and have high impact resistance and shape memory after deforming. Controlled crash functions improve safety features. Low weight helps to achieve good fuel economy.

Composites are in use today in applications where strength, lightness and safety are crucial, such as suspension, crash safety and chassis components.



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Composites provide a number of material features that are essential in the transportation industry.

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### • Low weight – lower energy consumption

Composites are much lighter than metals and this results in savings through lower installation costs, easier handling and lower fuel consumption.

### • Strength and stiffness

Strength is comparable to or better than steel and aluminium



## Profiles for buses and coaches

### External profiles: e.g. cant rails, skirts, third panels

The pultrusion technique allows the production of large external profiles of a uniform quality and strength. The high impact resistance of composites protects the surface from damage and scratching; and the excellent compatibility with paints make it possible to obtain a high-grade finishing touch. Bad weather conditions and air pollution will not affect the composite profiles due to their excellent resistance to corrosion. To keep the attractive surface, profiles can be cleaned with hot water, steam or chemicals. Typically body panels are fixed to the frame, using flexible polyurethane adhesives.

### Internal profiles: e.g. interior coves, air ducts, internal trim profiles, luggage supports

Coves are multifunctional in design. Publicity and lighting systems can be included in one and the same profile, which considerably reduces installations costs. Composite ducts cover the heating installations in the ceiling. The acoustic and thermal insulation properties reduces the loss of heat and absorbs the noise from ventilators, increasing travel comfort. Composite luggage supports are very light and offer a high tolerance towards damage and moisture.

providing lighter, safer and cheaper alternatives. Stiffness properties outperform plastic and other non metallic materials typically used. If required, the modulus values of metals can be matched through appropriate selection of reinforcements.

#### • Thermal stability and insulation

Composites are excellent insulators and contribute to the thermal efficiency

## Profiles for trains and trams

### Outer body panels

Composite profiles on the outer body can be produced over a meter wide, with integrated design and functional elements. These parts are typically adhesively bonded to the steel frame of the train and painted, together with the rest of the body. Although proper surface preparation is always a prerequisite, bonding and painting is straightforward.

### Interior parts

Based on the versatile material features together with superior shape capacities compared to other materials, inner train systems can be re-designed towards lower weight and lower total cost. The profile can span the whole ceiling from window to window. Typical applications are roof systems, air conditioning ducts and heating channels.

of the application: no cold bridges, no cold feeling, no condensation, no ice formation. They exhibit excellent shape stability, have low thermal coefficient of expansion, and do not get brittle when exposed to cold temperatures.

#### • High chemical and corrosion resistance

Composites resist a wide range of chemical agents and are unaffected by acid rains and salt sprayed roads: environments where metals suffer.



## Profiles for trucks and trailers

### Flooring

In addition to carbon- and glassfibre profiles, we also offer laminates to reinforce wood and pultruded corefilled panels to optimize the loading capacity and to minimize the weight.

### Side panels

Large side panels with uniform quality and strength can be pultruded. The integration of functions in the panels gives major advantages for the installation. Click-fit joining is but one example.

### Structural elements

Structural elements taking a part load of the truck can be made of composites. Mechanical strength with controlled flexibility offers new opportunities in road stability.

### Side racks

Composite profiles can be used under the truck as underrun bars, for storage racks etc. Low weight, damage tolerance and corrosion resistance are main features.

### Body and door framework profiles

Composite frame profiles are lightweight, robust. In refrigerated bod-

ies they also offer excellent thermal insulation properties which increases energy efficiency and prevents condensation and ice formation. An efficient adhesion system guarantees simple, fast assembly and thus reducing installation costs.

### External capping profiles

The shape capacities of our composites enables the design of streamlined capping profiles. This capability, together with inherent light weight increases vehicle fuel efficiency. Additionally, the profiles are corrosion resistant and chemically inert. Rain, air pollution or road salt do not affect the profiles.

### Internal trim profiles

Composites resist most types of cleaning products. Both scuff strips and internal corners can be hygienically designed so that dirt cannot collect in the corners: a key requirement for refrigerated transport.

### Insulated panels for sectional doors

A sectional roller-door consists of a number of individual hollow panels into which insulation foam is injected. The high insulation value of composites contributes to maintain the temperature in the refrigeration area, giving a substantial energy savings.

### • Shape capacity

Pultruded profiles offer the possibility to integrate functions in one and the same profile. This results in a reduction of parts required and also assists with easier installation.

### • Resilience

Composites are elastic materials: when deformed they can spring back to

shape without permanent damage. Shape memory and impact tolerance are important benefits to serve in the transport industry. Highest levels of toughness are reached using novel polyurethane resin systems.

### • Fire safety

Resin systems have been developed to comply with the very demanding fire safety regulations.

# Fabricating composites

## **Easy to fabricate**

Fast rotating diamond tipped tools are best suited for cutting, drilling and routing. Dust extraction is an option to consider for large jobs.

## **Easy to handle**

The continuous Pultrusion and Pull-winding processes permit profiles to be produced to any required length, limiting scrap and unattractive jointing. Despite their length, composite profiles are light to handle, show excellent shape stability and do not permanently deform with rough handling.

## **Easy to bond**

Flexible polyurethane adhesives are used to bond profiles to panels. While solvent cleaning on many occasions is sufficient, customers may wish to have peel ply moulded in the profile. After its removal, it leaves a clean, roughened surface, ready for bonding. Although riveting remains an option, adhesive bonding is the clean finish, watertight solution. For structural connections on limited surface areas, Exel Composites advise the use of toughened epoxies.

## **Easy to paint**

Two component polyurethane paints give excellent results, even without a primer layer and only solvent cleaning. High adhesion to a non-corroding substrate enables painted composites to survive the harshest weathering tests. Special care is needed in high humidity areas. The use of abrasive, steel wool type, rubbing cloths should be avoided as they could tear out of the fibres of the veil and leave a hairy surface. Nevertheless, specific formulations are available that do allow abrasives to be used.





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Exel Composites is a leading manufacturer of advanced composite products and solutions, meeting the requirements of environmental legislation, rules and regulations. We use only tested materials that are safe for the environment. Composites as material offer ecologically safe and friendly solutions due to their long life and durability.

At Exel we are committed to develop our products and processes in a manner that reduces the environmental impact. The Exel quality and environmental policy complies with the requirements of the standards ISO 9001:2000 and ISO 14001.

ISO 9001  
BUREAU VERITAS  
Certification

